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USER'S MANUAL

TRANSLATOR OPTION SD345 SPECTRASCOPE III

(SD345-OPTION-1)
LEASAMETRIC

Spectral Dynamics
Scientific-Atlanta

SERIAL NO. 322

USER'S MANUAL

TRANSLATOR OPTION SD345 SPECTRASCOPE III

(SD345-OPTION-T)

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SECTION I

GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains initial checkout and operating instructions for the Translator Option for the Spectral Dynamics Model SD345 FFT Analyzer. The manual is divided into three sections. Each section covers a specific aspect of the option. This manual is written for the operator and contains no maintenance information. Maintenance information is included in the Service Manual for the SD345 FFT Analyzer.

1.2 EQUIPMENT DESCRIPTION

The Translator Option circuitry is contained on PWA's 21076600, 21061300, and 21052300. These PWA's are located in the SD345 card positions A5A4, A5A5, and A5A6 respectively. Programming to implement the option is contained in the Microprogram for the SD345. With the PWA's inserted in their respective card positions, the Microprogram will respond to the appropriate front panel controls for the Translator Option. No additional equipment is required.

1.3 SPECIFICATIONS

Translation Characteristics

Zoom..... Translation zoom factors of 10, 20, 50, or 100. Selectable from front panel touch controls. Magnifies baseband resolution (f).

Zoom Center ..... Established by positioning the cursor to frequency of interest.

Center frequency cell processing limits are:

Zoom Factor	Limits lower	upper
10	10	390
20	5	395
50	2	398
100	1	399

Zoom Set ..... Holds center frequency and permits cursor movement within translated display.

Output Characteristics

Gain..... Post translation gain of X1 (unity), X2, X4, or X8. Selectable from front panel touch controls.

Translated Output ..... 12-bit digital data represents translated spectrum (100 cells below and above center frequency).

1.4 REPLACEMENT PARTS

Except for some special SDC specification controlled parts listed in Tables 1-1 and 1-2, standard electronic parts are used in the Translator Option circuitry. Parts that are commonly used in the SD345 can be found in the SD345 User's Manual. Spectral Dynamics maintains a stock of all parts used in this option.

When ordering parts, include assembly number of the PWA, reference designation, description, and Spectral Dynamics part number. Also include the instrument serial number and complete model number including "dash" number.

Table 1-1. Replacement Parts for Translator Option, PWA 21076600, Sin — Cos/Control Card.

Reference Designator	Description	Part No.
A5A4U8, 18, 28	IC, 2's Complement Multiplier, Fairchild Part No. 93S43PC	10594802
A5A4U10	IC, PROM (XSN4)	10489700
A5A4U14	IC, PROM (XLT2)	21059700
A5A4U20	IC, PROM (XSN2)	10489500
A5A4U21	IC, PROM (XLT3)	21059800
A5A4U24	IC, PROM (XLT1)	21059600
A5A4U30	IC, PROM (XSN3)	10489600
A5A4U31	IC, PROM (XLT4)	21059900
A5A4U41	IC, PROM (XSN1)	10489400
A5A4U42	IC, PROM (XLT5)	21060000
A5A4U57	IC, PROM (LPC2)	21060200
A5A4U68	IC, PROM (LPC1)	21060100

Table 1-2. Replacement Parts for Translator Option, PWA 21052300, Filter Card.

Reference Designator	Description	Part No.
A5A6U9	IC, PROM (XCF1)	21055900
A5A6U19	IC, PROM (XCF3)	21056100
A5A6U24	IC, PROM (XCF4)	21056200
A5A6U30	IC, PROM (XCF2)	21056000
A5A6U46	IC, FPLA (XSM)	21138701
A5A6U47	IC, FPLA (XSL)	21138703
A5A6U58	IC, FPLA (XOF)	21138702

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section contains instructions for performing initial inspection of the Model SD345 Translator Option. Procedures for inspecting, checking for physical damage, reshipment, and returning under warranty or damage claims are found in the SD345 User's Manual.

2.2 PREPARATION FOR USE

2.2.1 Option Included with Instrument

If the Translator Option is included with the SD345, this subsection does not apply. Continue to Section III, Operation.

2.2.2 Option Installed in the Field

When this option is to be installed in the field, the following procedure should be followed.

a. Ensure that the SD345 is operating properly.

b. Remove power from the SD345.

c. Unplug the instrument.

d. Remove the top cover.

e. Ensure that all plug-in IC's are firmly seated and that component parts on the option cards do not protrude enough to be damaged when the cards are placed in their respective card slots.

f. Carefully insert each card in its respective card slot with component side of PWA to the left.

PWA 21076600 — A5A4

PWA 21061300 — A5A5

PWA 21052300 — A5A6

g. Make sure that the cards are fully seated and that the tops of the cards are even with the tops of the other cards.

h. Replace top cover.

i. Plug in the SD345 and turn on power.

SECTION III

OPERATION

3.1 INTRODUCTION

This section provides the operator with a description of the translator operations, the front-panel touch controls that affect or that are affected by the option, and an operational checkout.

3.2 OPERATING MODES

3.2.1 General Overview

The Model SD345 Translator Option provides increased resolution by magnifying a selectable portion of the normal narrow band spectrum. This is accomplished by setting the cursor on one narrow band cell, and activating the SD345 front-panel TRANSLATOR ON touch control. The Translator Option then applies a translation zoom factor of 10, 20, 50, or 100 about this center frequency. Table 3-1 shows the Hz/cell resolution, the display analysis bandwidth, and the memory period for each frequency range and each zoom factor. The Translator Option also provides a post-filter gain selection of 1, 2, 4, or 8.

3.2.2 CRT Annotation

When using the Translator Option, the analysis frequency range (item 6 in Figure 3-5 of the SD345 User's Manual) is not displayed. In its place, the scale limits are displayed when the ZOOM SET touch control is pressed. Other annotation data remains the same.

3.3 FRONT PANEL CONTROLS AND INDICATORS

Most front-panel controls and indicators will function in the same manner as described in the SD345 User's Manual. However, certain switch combinations can produce slightly different results than stated in the SD345 User's Manual. Other combinations may produce seemingly valid data that requires some interpretation. These combinations are discussed in the following paragraphs.

3.3.1 INPUT Group

All touch controls and indicators in this group operate as described in the SD345 User's Manual when used with the Translator Option.

3.3.2 SENSITIVITY Group

All touch controls and indicators in this group operate as described in the SD345 User's Manual when used with the Translator Option.

3.3.3 ANALYSIS Group

SPECTRUM

This group of controls is not used with the Translator Option.

Display Mode Touch Controls

The Display mode X4 touch control can be used with the Translator Option; however, the translation function should be set up before activating the control. When used with the Translator Option, the upper and lower graticule annotations for frequency windows will not change when the spectrum is scanned.

All other touch controls in this group operate as described in the SD345 User's Manual.

3.3.4 TRANSLATOR Group

This group of controls provides the information that defines parameters to process the input signal for the translate function. Before activating the TRANSLATOR ON touch control, the cursor should be positioned to the center of the frequency band to be expanded.

ON Touch Control

This touch control sets the SD345 to the Translate mode of operation and centers the frequency cell of the last cursor position on the crt graticule; also sets ZOOM 10 and GAIN 1. The upper and lower frequency limits of the crt spectrum display are determined by the frequency range selected.

Table 3-1. Translator Option Parameters

Frequency Range	Normal Display		X 10 Zoom			X 20 Zoom		
	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)
1 Hz	.0025	400	.05	.00025	4000	.025	.000125	8000
2 Hz	.005	200	.1	.0005	2000	.05	.00025	4000
5 Hz	.0125	80	.25	.00125	800	.125	.000625	1600
10 Hz	.025	40	.5	.0025	400	.25	.00125	800
20 Hz	.05	20	1.0	.005	200	.5	.0025	400
50 Hz	.125	8	2.5	.0125	80	1.25	.00625	160
100 Hz	.25	4	5.0	.025	40	2.5	.0125	80
200 Hz	.5	2	10.0	.05	20	5.0	.025	40
500 Hz	1.25	.8	25.0	.125	8	12.5	.0625	16
1 kHz	2.5	.4	50.0	.25	4	25.0	.125	8
2 kHz	5	.2	100	.5	2	50.0	.25	4
5 kHz	12.5	.08	250	1.25	.8	125	.625	1.6
10 kHz	25	.04	500	2.5	.4	250	1.25	.8
20 kHz	50	.02	1000	5.0	.2	500	2.5	.4
50 kHz	125	.008	2500	12.5	.08	1250	6.25	.16
100 kHz	250	.004	5000	25.0	.04	2500	12.5	.08

Table 3-1. Translator Option Parameters (Continued)

Frequency Range	Normal Display		X 50 Zoom			X 100 Zoom		
	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)	Display Analysis Band-Width	Resolution Hz/Cell	Memory Period (Seconds)
1 Hz	.0025	400	.01	.00005	20000	.005	.000025	40000
2 Hz	.005	200	.02	.0001	10000	.01	.00005	20000
5 Hz	.0125	80	.05	.00025	4000	.025	.000125	8000
10 Hz	.025	40	.1	.0005	2000	.05	.00025	4000
20 Hz	.05	20	.2	.001	1000	.1	.0005	2000
50 Hz	.125	8	.5	.0025	400	.25	.00125	800
100 Hz	.25	4	1.0	.005	200	.5	.0025	400
200 Hz	.5	2	2.0	.01	100	1.0	.005	200
500 Hz	1.25	.8	5.0	.025	40	2.5	.0125	80
1 kHz	2.5	.4	10.0	.05	20	5.0	.025	40
2 kHz	5	.2	20.0	.1	10	10.0	.05	20
5 kHz	12.5	.08	50.0	.25	4	25.0	.125	8
10 kHz	25	.04	100	.5	2	50.0	.25	4
20 kHz	50	.02	200	1.0	1	100	.5	2
50 kHz	125	.008	500	2.5	.4	250	1.25	.8
100 kHz	250	.004	1000	5	.2	500	2.5	.4

ZOOM SET Touch Control

This control locks the center frequency, establishing the spectrum limits each side of center and displaying the limits in the crt annotation where the frequency range is normally displayed. If this control is not activated, the center frequency will change when the cursor is moved. When ZOOM SET is on, the cursor can be moved without the display changing its position within the spectrum range.

ZOOM Touch Controls

These controls allow the operator to expand the display on each side of the center frequency. With ZOOM 10 activated, 10 cells on each side of the center frequency are expanded to 100 cells. Table 3-1 shows the frequencies represented in each expanded cell.

GAIN Touch Controls

These controls allow the operator to amplify (digitally) the spectrum content within the ZOOM display (window). If the resultant gain produces a signal that exceeds the upper limit of the display, the display spectrum is rescaled to the next higher or lower range. The Y scale annotation at the left of the graticule will also be changed to agree with the new scaling factor.

3.3.5 CRT Group

The Translator Option does not affect this group.

3.3.6 CURSOR Group

X Touch Control

Only the Hz touch control is used with the Translator Option.

All other controls in this group operate as described in the SD345 User's Manual.

3.4 OPERATIONAL CHECKS

Test conditions set up in the following paragraphs check the Translator Option to assure that center frequency ranges are selected in all frequency ranges and that zoom and gain limits are correct. These checks are made using a Model 4300A Krohn-Hite oscillator or equivalent low-distortion sine wave generator.

The Translator Option checks assume that the SD345 has been thoroughly checked and is operating properly.

3.4.1 100 kHz Center Frequency Checks

a. Set front-panel touch controls as follows:

GAIN-X	LIN, X1
GAIN-Y	LIN, X1
AVG	EXPO, N = 4, START
INPUT LEVEL	1 Vrms
FUNCTION	SPECT, OPER
ACST WTG	OFF
FREQ RANGE	100 kHz
WTG	OFF
UPDATE	ON
SPECTRUM	NB
CURSOR	NORM
CURSOR-Y	dB
CURSOR-X	Hz
TRANSLATOR	OFF

b. Apply a sine wave signal of 60 kHz at approximately 1 Vrms to the front panel input connector.

NOTE

Signal frequency and amplitude can be checked by positioning the cursor to the 60 kHz cell and adjusting the sine wave signal until the cursor appears at the top of the resultant spectrum signal. In the same manner the sine wave amplitude can be adjusted for 1 Vrms by adjusting the input sine wave for a 0.0 db reading in the cursor annotated display.

c. With the applied signal adjusted and the cursor positioned to the top of the displayed spectrum, press the TRANSLATOR ON touch control.

d. The following display and indicator changes will occur:

1. The TRANSLATOR ON, GAIN 1, and ZOOM 10 indicators will light.

2. The frequency range annotation below the left and right graticule lines will be blanked.

3. The displayed spectrum will move to the center of the crt.

4. The cursor will remain in its previous position.

e. Press the ZOOM SET touch control.

1. The ZOOM SET indicator will light.

2. Frequency range annotation will indicate 57500 Hz on the left and 62500 Hz on the right.

3. Spectrum amplitude will not change.

f. Press the ZOOM 20 touch control.

1. The ZOOM 10 indicator will extinguish and the ZOOM 20 indicator will light.

2. The frequency range annotation will indicate 58750 Hz on the left and 61250 Hz on the right.

g . Reposition the cursor to the top of the spectrum.

1. Cursor position annotation will indicate between 59987.5 and 60012.5 Hz.

2. Display may shift slightly but cursor position should be within the above limits.

NOTE

As the spectrum is expanded, the exact frequency of the input signal will become more precise.

h. Press ZOOM 50 touch control.

1. The ZOOM 20 indicator will extinguish and the ZOOM 50 indicator will light.

2. The frequency range annotation will indicate 59500 Hz on the left and 60500 Hz on the right.

i. Reposition the cursor to the top of the spectrum.

1. Cursor position annotation will indicate between 59987.5 and 60012.5 Hz.

j. Press the ZOOM 100 touch control.

1. The ZOOM 50 indicator will extinguish and the ZOOM 100 indicator will light.

2. The frequency range annotation will indicate 59750 Hz on the left and 60250 Hz on the right.

k. Reposition the cursor to the top of the spectrum.

1. Cursor position annotation will indicate between 59987.5 and 60012.5 Hz.

l. Press the ZOOM 1 touch control.

1. The ZOOM 100 indicator will extinguish and the ZOOM 1 indicator will light.

2. The display will return to the conditions listed in step e above.

3.4.2 ZOOM GAIN Check

a. With the signal as displayed at the end of the previous checks, set GAIN LOG touch control.

b. Press the SIGNAL INPUT HOLD touch control.

c. The spectrum will stop updating and the display will remain fixed on the crt.

d. Record the Y dB reading.

e. Sequentially press the TRANSLATOR GAIN 2, 4, and 8 touch controls.

f. The following annotation changes will occur:

1. TRANSLATOR GAIN 2

Vertical Scale reading = +4 to −56 dB
Cursor position = Y dB recorded in step d + 6 dB

2. TRANSLATOR GAIN 4

Vertical scale = −2 to −62 dB
Cursor position = Y dB recorded in step d. + 12 dB

3. TRANSLATOR GAIN 8

Vertical scale = −8 to −68 dB
Cursor position = Y dB recorded in step d. + 18 dB

3.4.3 50 — 10 kHz Center Frequency Checks

a. Set front-panel touch controls as listed in 3.4.1 step a, except set FREQ RANGE to 10 kHz.

b. Apply a sine wave signal of 6 kHz at approximately 1 Vrms. (Refer to note in 3.4.1 step b.)

c. With the applied signal adjusted and the cursor positioned to the top of the signal, press the TRANSLATOR ON touch control.

d. The TRANSLATOR ON, GAIN 1, and ZOOM 10 indicators will light, and the crt spectrum display will move to the center vertical line.

e. The cursor will remain in its previous position on the display and the frequency range annotation will be blanked.

f. Press the ZOOM SET touch control.

g. The following display and indicator changes will occur:

   1. ZOOM SET and ZOOM 10 indicators will light.

   2. The graticule limit annotation will indicate 5750 Hz on the left and 6250 Hz on the right.

   3. Cursor will appear at the right of the display.

h. Press TRANSLATOR ON touch control to return to normal operating mode.

i. Increase frequency range by pressing the up-arrow FREQ touch control.

j. The crt spectrum display will move to the left three graticule divisions.

k. Position the cursor to the top of the spectrum.

l. Press the TRANSLATOR ON, wait for the crt spectrum display to reappear in the center, then press the ZOOM SET touch control.

   1. Frequency range annotation will be 5500 Hz on the left and 6500 Hz on the right.

m. Press the ZOOM 20 touch control.

n. Position the cursor to the top of the crt spectrum display.

o. The appropriate indicators will light and the following crt annotations will be displayed.

   1. Frequency Range: Left — 5750 Hz
      Right — 6250 Hz

   2. Cursor Position: between 5595.00 and 6002.5 Hz.

p. Press TRANSLATOR ON touch control to return to normal operating mode.

q. Increase frequency range by pressing the up-arrow FREQ touch control.

r. The crt spectrum display will move to the left approximately one and a half graticule divisions.

s. Position the cursor to the top of the spectrum.

t. Press TRANSLATOR ON, ZOOM SET, and ZOOM 50 touch controls; then position cursor to top of spectrum.

u. The appropriate indicators will light and the following crt annotations will be displayed:

   1 . Frequency Range: Left — 5750 Hz
      Right — 6250 Hz

   2. Cursor Position: 6000 Hz

v. Press TRANSLATOR ON touch control to return to normal operating mode.

3.4.4 5-1 kHz Center Frequency Checks

a. Set LEVEL VOLTS to 0.1 Vrms and FREQ to 1 kHz.

b. Press INPUT SIGNAL TEST touch control.

c. Position cursor to top of displayed spectrum.

d. Press TRANSLATOR ON and ZOOM SET touch controls; then position cursor to top of spectrum.

e. The appropriate indicators will light and the following crt annotations will be displayed.

   1. Frequency Range: Left — 615.0 Hz
      Right — 665.0 Hz

   2. Cursor Position: 64.000 Hz

f. Press TRANSLATOR ON touch control to return to normal operating mode.

g. Increase FREQ range to 2 kHz.

h. Position cursor to top of spectrum. Press TRANSLATOR ON and ZOOM SET touch controls; then reposition cursor to top of spectrum.

i. The appropriate indicators will light and the following crt annotations will be displayed:

   1. Frequency Range: Left — 1230 Hz
      Right — 1330 Hz

   2. Cursor Position: 1280.000 Hz

j. Press TRANSLATOR ON touch control to return to normal operating mode.

k. Increase FREQ range to 5 kHz.

l. Position cursor to top of spectrum. Press TRANSLATOR ON and ZOOM SET touch controls; then reposition cursor to top of spectrum.

m. The appropriate indicators will light and the following crt annotations will be displayed:

   1. Frequency Range: Left — 3075.0 Hz
      Right — 3325.0 Hz

   2. Cursor Position: 3200.00 Hz

3.4.5 Lower Frequency Ranges

By using the internal test signal in the manner described in 3.4.4 above, all lower frequencies can be checked for the following results:

Selected Frequency (Hz)	Range (Hz)		Cursor
	Left	Right	Position (Hz)
500	307.50	332.50	320.000
200	123.0	133.0	128.0000
100	61.5	66.5	64.0000
50	30.750	33.250	32.0000
20	12.30	13.30	12.8000*
10	6.150	6.650	6.40000*

*In these ranges, complete spectrum update will require several minutes.

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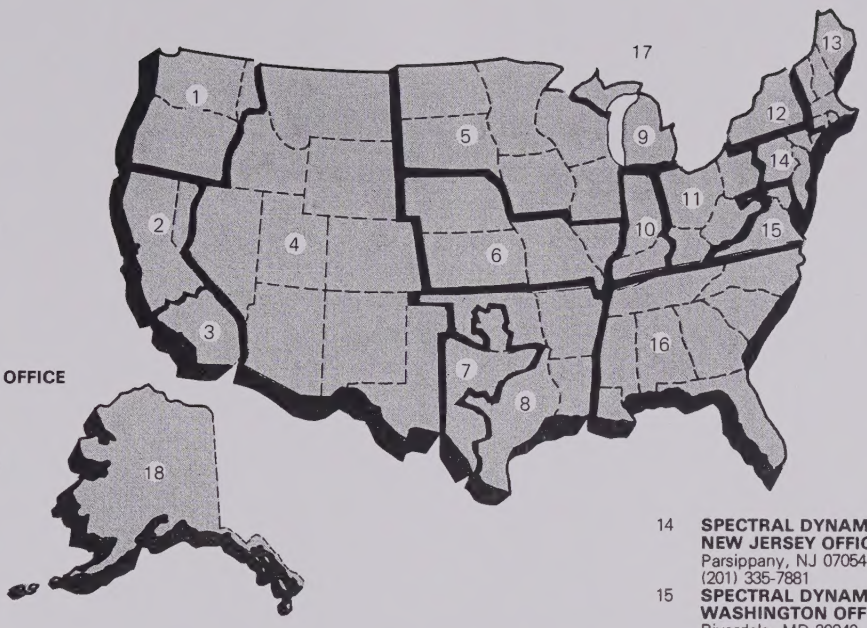

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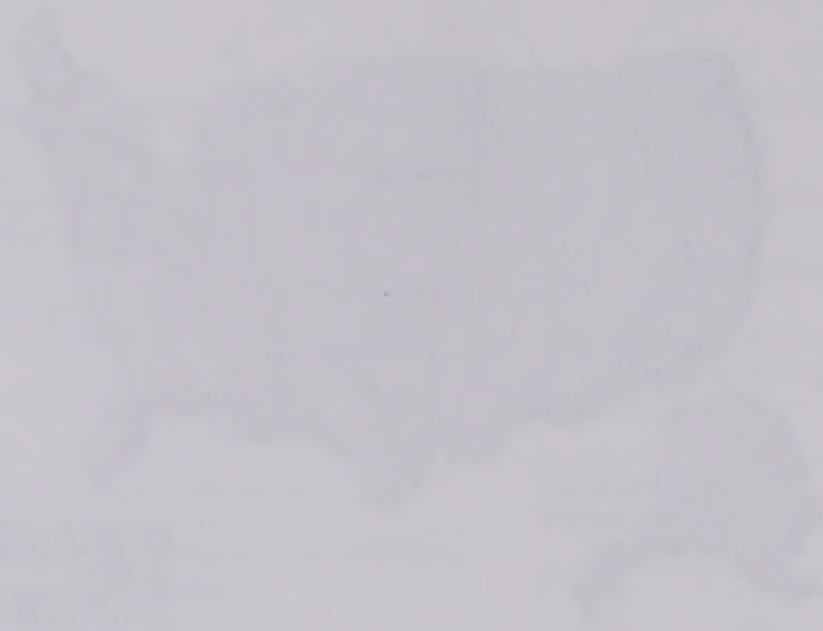

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